

**SECTION 260943**  
**NETWORK LIGHTING CONTROLS**  
**Lutron EcoSystem**

This section includes editing notes to assist the user in editing the section to suit project requirements. These notes are included as hidden text, and can be revealed or hidden by one of the following methods:

- Microsoft Word: From the pull-down menus select TOOLS, then OPTIONS. Under the tab labeled VIEW, select or deselect the HIDDEN TEXT option.
- Corel WordPerfect: From the pull-down menus select VIEW, then select or deselect the HIDDEN TEXT option.

**PART 1- GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Distributed fluorescent lighting control system.
- B. Related Sections:
  - 1. Section [262726 - Wiring Devices]
  - 2. Section [265113 – Interior Lighting Fixtures, Lamps, and Ballasts:] Fluorescent lighting ballasts controlled by central dimming control system.
  - 3. Section [260923 – Lighting Control Devices:] Occupancy sensors used in conjunction with central dimming control system.

**1.2 REFERENCES**

- A. American National Standards Institute/Institute of Electrical and Electronic Engineers (ANSI/IEEE)
  - 1. C62.41-1991 – Recommended Practice for Surge Voltages in Low-Voltage AC Power Circuits.
- B. ASTM International (ASTM)
  - 1. D4674 -02a Standard Test Method for Accelerated Testing for Color Stability of Plastics Exposed to Indoor Fluorescent Lighting and Window-Filtered Daylight.
- C. Canadian Standards Association (CSA) .
  - 1. CSA C22.2 # 14 Industrial Control Equipment
  - 2. CSA C22.2 # 184 Solid-State Lighting Controls
- D. International Electrotechnical Commission .
  - 1. (IEC) 801-2 Electrostatic Discharge Testing Standard.
  - 2. IEC/EN 60669-2-1 Switches for household and similar fixed electrical installations - electronic switches.
- E. International Organization for Standardization (ISO)
  - 1. 9001:2000 – Quality Management Systems.
- F. National Electrical Manufacturers Association (NEMA)
  - 1. WD1 (R2005) - General Color Requirements for Wiring Devices.
- G. Norma Oficial Mexicana (NOM).
  - 1. NOM-003-SCFI Productos eléctricos - Especificaciones de seguridad (Electrical products - Safety Specifications)
- H. Underwriters Laboratories, Inc. (UL):
  - 1. 508 (1999) - Standard for Industrial Control Equipment.
  - 2. 1472 (1996) - Solid-State Dimming Controls.
  - 3. 924 (2003) - Emergency Lighting and Power Equipment
  - 4. 935 (2005) - Fluorescent Ballasts

**1.3 SYSTEM DESCRIPTION**

- A. Central dimming control system
  - 1. Handheld lighting control software and programmers.
  - 2. Low voltage [wall stations] [and] [control interfaces] [and] [sensors].
  - 3. [Solid-state high frequency fluorescent dimming ballasts.]

**1.4 SUBMITTALS**

- A. Submit under provisions of Section [013300.]
- B. Specification Conformance Document: Indicate whether the submitted equipment:
  - 1. Meets specification exactly as stated.

- 2. Meets specification via an alternate means and indicate the specific methodology used.
- C. Shop Drawings; include:
  - 1. Schematic of system.
- D. Product Data: Catalog cut sheets with performance specifications demonstrating compliance with specified requirements.

#### 1.5 QUALITY ASSURANCE

- A. Manufacturer: Minimum [10] years experience in manufacture of architectural lighting controls.
- B. Manufacturer's Quality System: Registered to ISO 9001:2000 Quality Standard, including in-house engineering for product design activities.
- C. Lighting control system components:
  - 1. Listed by [CE] [CSA] [NOM] [UL] specifically for the required loads. Provide evidence of compliance upon request.

#### 1.6 PROJECT CONDITIONS

- A. Do not install equipment until following conditions can be maintained in spaces to receive equipment:
  - 1. Ambient temperature: 0° to 40° C (32° to 104° F).
  - 2. Relative humidity: Maximum 90 percent, non-condensing.
  - 3. Lighting control system must be protected from dust during installation.

#### 1.7 WARRANTY

- A. Ballast warranty is specified in section [265113] – Ballasts.
- B. Provide manufacturer's warranty covering [3 years] [5 years with factory commissioning] on EcoSystem modules from date of purchase.
- C. Provide manufacturer's warranty covering two-year parts and labor and eight year limited parts warranty to repair and replace defective equipment applicable to daylight sensors, occupancy sensors, wall stations, bus supply, and infrared receivers.
- D. Provide manufacturer's full [10 year] warranty covering 100% parts and 100% labor for modules, daylight sensors, wall stations, bus supply, and infrared receivers from the date of system commissioning.

#### 1.8 COMMISSIONING

- A. Provide factory-certified field service engineer to ensure proper system installation and operation under following parameters:
  - 1. Qualifications for factory-certified field service engineer:
    - a. Minimum experience of 2 years training in the electrical/electronic field.
    - b. Certified by the equipment manufacturer on the system installed.
  - 2. Site visit activities:
    - a. Verify connection of power feeds and load circuits.
    - b. Verify connection of controls.
    - c. Verify system operation control by control, circuit by circuit.
    - d. Obtain sign-off on system functions.
    - e. Demonstrate and educate Owner's representative on system capabilities, operation and maintenance

#### 1.9 MAINTENANCE

- A. Make ordering of new equipment for expansions, replacements, and spare parts available to end user.
- B. Make new replacement parts available for minimum of ten years from date of manufacture.
- C. Provide factory direct technical support hotline 24 hours per day, 7 days per week.
- D. Provide on-site service support within 24 hours anywhere in continental United States and within 72 hours worldwide except where special visas are required.
- E. Offer renewable service contract on yearly basis, to include parts, factory labor, and annual training visits. Make service contracts available up to ten years after date of system commissioning.

### PART 2- PRODUCTS

#### 2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Lutron Electronics Co., Inc. – System: Lutron EcoSystem
- B. [Basis of design product: Lutron EcoSystem or subject to compliance and prior approval with

specified requirements of this section, one of the following:]

1. Lutron EcoSystem
- C. Substitutions: [Not permitted.] [Under provisions of Division 1.]
  1. All proposed substitutions (clearly delineated as such) must be submitted in writing for approval by the design professional a minimum of 10 working days prior to the bid date and must be made available to all bidders. Proposed substitutes must be accompanied by a review of the specification noting compliance on a line-by-line basis.
  2. Any substitutions provided by the contractor shall be reviewed at the contractor's expense by the electrical engineer at a rate of [\$200.00] per hour.
  3. By using pre-approved substitutions, the contractor accepts responsibility and associated costs for all required modifications to circuitry, devices, and wiring. The contractor shall provide complete engineered shop drawings (including power wiring) with deviations for the original design highlighted in an alternate color to the engineer for review and approval prior to rough-in.

## 2.2 General EcoSystem Performance

- A. [Daylight Harvesting] [Occupant Detection] [Personal Control] to control lighting with the following hierarchy:
  1. Emergency (Highest priority): Ignores all other inputs.
  2. Programming: During system programming, sensor inputs are ignored.
  3. Occupant sensor: Allows lights to be on/off.
  4. Daylight sensor: Imposes a high end limit for light output.
  5. Personal control: Fine tune light levels up to the daylight sensor limit.
- B. Response to a single sensor can be unique on fixture by fixture basis.
- C. Power failure recovery – All devices return to their previous light level prior to power loss.
- D. All programmable devices have integral power failure memory to maintain settings for a minimum of 10 years during power loss.
- E. Wall station and sensor replacement is accomplished without programming.

## 2.3 EcoSystem Bus Supply

- A. General
  1. Connect without interface to:
    - a. Occupancy sensors.
    - b. Building management / integration contact closure outputs.
    - c. Fire alarm or security system contact closures.
    - d. Emergency lighting interface [Lutron LUT-ELI] listed to UL 924.
  2. Integral fault protection to prevent bus supply failure in the event of a mis-wire.
  3. LED status indicators:
    - a. Bus supply is powered.
    - b. Bus supply operating properly.
    - c. Bus communication.
    - d. Emergency condition active / non-active.
  4. Configuration switches:
    - a. Override bus to full light output.
    - b. Override bus to low end.
    - c. Override bus to off.
    - d. Closure inputs normally open/closed.
  5. Enable/disable system programming (lockout).
- B. Field Mounted EcoSystem Bus Supply
  1. Integral clip for mounting on DIN rail.
- C. Wall Mounted EcoSystem Bus Supply
  1. Provide digital bus power supply in a pre-assembled NEMA listed enclosure with terminal blocks listed for field wiring.

## 2.4 EcoSystem Ballast Module

- A. General
  1. Continuous 3-Wire signal dimming to Lutron 3-Wire electronic dimming ballast.

2. Connect without interface to:
  - a. Occupant sensor (motion detector).
  - b. Daylight sensor.
  - c. Personal control input (wall station or infrared receiver).
3. Generate digital communication commands to distribute ballast and sensor data on the digital bus.
4. If power is interrupted and subsequently returned, lights automatically return to the setting prior to power interruption.
5. Each ballast responds independently:
  - a. Up to 64 occupant sensors.
  - b. Up to 64 personal control inputs.
  - c. 2 daylight sensors.
6. Unique internal reference number visibly displayed on module cover.
7. Averages 2 independent daylight harvesting inputs internally.
8. Responds to digital load shed command
  - a. Sets high end trim.
  - b. Automatically scales light output proportional to load shed command.
    - 1) Example: If light output is at 30% and a load shed command of 10% is received, the ballast automatically sets the maximum light output at 90% and lowers current light output by 3% to 27%.
9. Electrical: Dimmer to meet limited short circuit test as defined in UL 20.
10. Provide integral fault protection to prevent ballast module failure in the event of a mis-wire.
- B. 2 Amp (BMF) 3-Wire Ballast Module
  1. Ballast module to integrate up to 2 amps of Lutron 3-wire electronic dimming ballast into an EcoSystem control system as a single zone.
- C. 16 Amp (BMJ) 3-Wire Ballast Module
  1. Ballast module to integrate up to 16 amps of Lutron 3-wire electronic dimming ballast into an EcoSystem control system as a single zone.

## 2.5 LOW-VOLTAGE WALL STATIONS

- A. Product: [EcoSystem 1B – Lutron Model CC-1BRL-WH.] [EcoSystem 4B – Lutron Model CC-4BRL-WH.]
- B. General:
  1. Class 2 (low voltage).
  2. Integral IR receiver for programming.
  3. Immediate local LED response upon button activation to indicate that a system command has been requested.
  4. Wall stations can be replaced without reprogramming.
  5. Color:
    - a. Match NEMA WD1, Section 2 White.
    - b. Color variation in same product family: Maximum  $\Delta E=1$ , CIE  $L^*a^*b$  color units.
    - c. Visible parts: Exhibit ultraviolet color stability when tested with multiple actinic light sources as defined in ASTM D4674. Provide proof of testing upon request.
- C. One Button Control
  1. Toggle on/off and master raise/lower control for group of fixtures.
  2. "Press and Hold" button programming for creating and modifying groups.
- D. Four Button Control
  1. Recall 4 Scenes plus all on or all off for one group of fixtures.
  2. Master raise/lower control entire group of fixtures.
  3. "Press and Hold" button programming supports:
    - a. Create and modify groups.
    - b. Modify scene levels.

## 2.6 SENSORS

- A. General:

1. Use Class 2 wiring for low voltage communication.
  2. Can be replaced without reprogramming.
  3. Constructed via sonic welding
  4. Color:
    - a. Match NEMA WD1, Section 2 White.
    - b. Color variation in same product family: Maximum  $\Delta E=1$ , CIE  $L^*a^*b$  color units.
    - c. Visible parts: Exhibit ultraviolet color stability when tested with multiple actinic light sources as defined in ASTM D4674. Provide proof of testing upon request.
  5. Mountable on lighting fixtures or recessed acoustical ceiling tiles.
  - B. Infrared Receivers have 360 degree reception of wireless infrared remote controls.
    1. Immediate local LED response upon reception of hand held transmitter communication.
    2. Constructed with plastic meeting UL94 HB.
  - C. Interior Daylight Sensors
    1. Open-loop basis for daylight sensor control scheme.
    2. Stable output over temperature from 0° to 40° C.
    3. Partially shielded for accurate detection of available daylight to prevent fixture lighting and horizontal light component from skewing sensor detection.
    4. Provide linear response from 0 to 500 foot-candles.
    5. Integral IR receiver for programming.
    6. Constructed with plastic meeting UL94 HB.
  - D. Occupancy Sensors
    1. Connect directly to EcoSystem ballast, modules, and bus supply without the need of a power pack or other interface.
- 2.7 Hand Held Programmer
- A. General
    1. Wireless programming for all system settings.
    2. Secured via pass code.
    3. Replace ballast via serial number.
    4. Only operates as a lighting control device.
    5. Non-volatile memory stores lighting control software for minimum of 10 years for power loss.
    6. Stores not system specific configuration settings
- 2.8 POWER INTERFACES
- A. Product: [FDI-INC.] [FDI-ELV.]
  - B. Electrical:
    1. Phase independent of control input.
    2. Dimmer to meet limited short circuit test as defined in UL 20.
  - C. Diagnostics and Service: Replacing power interface does not require re-programming of system or processor.
- 2.9 ACCESSORIES
- A. Tamper Proof Covers:
    1. Locking covers for preset control units and wall stations: Reversible to allow lock to be located on either side of control.
    2. Compatible with IR controls.
  - B. Infrared Transmitters:
    1. Provide wireless remote control capable of recalling "on" plus "off", one favorite scene, and of fine-tuning light levels with master raise/lower.
    2. Designed for use in conjunction with compatible infrared receiver and lighting control; dependent on that receiver, not transmitter.
    3. Operate up to 25 feet (7.5 meters) within line-of-sight to that receiver.
    4. "Learnable" by other variable frequency remote controls.
- 2.10 SOURCE QUALITY CONTROL
- A. Perform full-function testing on all completed assemblies at end of line. Statistical sampling is not

acceptable.

- B. Diagnostics and Service – Tiered control scheme for dealing with component failure that minimizes loss of control for occupant.
  - 1. Bus failure: Lights go to emergency level for safety.
  - 2. Failure of one sensor type: Ballast still controllable via other sensors.
  - 3. Ballast failure: Only impacts one fixture – remainder of system operates as programmed.

### **PART 3- EXECUTION**

#### **3.1 INSTALLATION**

- A. Install equipment in accordance with manufacturer's installation instructions.
- B. Provide complete installation of system in accordance with Contract Documents.
- C. Provide equipment at locations and in quantities indicated on Drawings. Provide any additional equipment required to provide control intent.
- D. Ensure that daylight sensor placement minimizes sensors view of electric light sources; ceiling mounted and fixture-mounted daylight sensors shall not have direct view of luminaries.

END OF SECTION